

CLAIMS

1. Unit for sorting and packaging products capable of being hung on a hooking member (24) for the purpose of
5 their conveyance, such as bunches of fruits, in particular table grapes or truss tomatoes, characterised in that it comprises in combination:
- * a conveying line (2, 3) with an endless chain (1) moving in a substantially horizontal plane and beneath
10 which there are distributed a plurality of coupling arms (12) articulated with respect to the said chain about a vertical axis, so as to be able to pivot between two positions, called the pulling and grasping positions, each of the said coupling arms being
15 associated with resilient means (14) capable of urging its pivoting towards its grasping position, and having a free end equipped with a coupling member (15),
 - * a conveying track (17) which forms a circuit parallel to that of the conveying line (2, 3), extends in a
20 horizontal plane situated beneath that of the said conveying line vertically in line with the coupling members (15) of the coupling arms (12) in the pulling position of the latter, and on which there are arranged a plurality of plates (16), each equipped, on
25 the one hand, with a coupling member (19) capable of being coupled to the coupling member (15) of a coupling arm (12) for the purpose of pulling each of the said plates by one of the said coupling arms, and, on the other hand, with a hooking member (24) for
30 hanging a product beneath the said plate,
 - * a plurality of work stations Cm, Dn, distributed laterally along the conveying line (2, 3) and each having:

- a track, called the relief track (29), equipped with two end sections (31, 33) for joining to the conveying track (17) and with a central section (32) extending parallel to the conveying line (2, 3), vertically in line with the coupling members (15) of the coupling arms (12) in the grasping position of the latter,
- routing means (34, 35) arranged at the junction between the access section (31) of the relief track (29) and the conveying track (17),
- uncoupling means (36) capable of releasing the coupling members (15, 19) of the coupling arms (12) and of the plates (16),
- means (40) for driving the uncoupled plates (16) capable of displacing them along the central section (32) of the relief track (29) as far as a position of readiness, called the "front of the queue" position,
- coupling means (41, 45, 46) capable of enabling, when instructed, a coupling of the plate (16) situated at the front of the queue to a coupling arm (12) of the conveying line (2, 3), in the grasping position of this arm,
- * an optical and/or ponderal analysing station (10) arranged along the conveying track (17) for the purpose of providing information enabling the sorting of the products according to predetermined selection criteria,
- * a detecting station (11) arranged along the conveying track (17) and adapted to detect the passage of the empty plates (16) pulled along the said conveying track by a coupling arm (12),

- * the said analysing station and detecting station being arranged so as to delimit two distinct zones along the path of the conveying line (2, 3), consisting, as viewed in the direction of movement of the endless chain (1), of:
- a product-unloading zone (L3, L4, L6); which has, as the upstream starting limit, the analysing station (10) and along which n work stations Dn are distributed,
 - and a product-loading zone (L1), which has, as the upstream starting limit, the detecting station (11) and along which m work stations Cm are distributed,
- * and programmed managing means capable, in the loading zone (L1), of controlling the routing means (34, 35) of the work stations Cm so as to distribute to the said work stations the empty plates (16) detected by the detecting station (11), and, in the unloading zone (L3, L4, L6), of controlling the routing means (34, 35) of the work stations Dn so as to supply each of the said work stations with products of a given classification.
2. Sorting and packaging unit according to Claim 1, characterised in that the coupling members (15, 19) of the coupling arms (12) and of the plates (16) comprise front coupling faces capable of enabling coupling by frontal abutment of the said coupling faces, which leads to pulling of the plates (16) by the coupling arms (12), and uncoupling by pivoting the said coupling arms towards their pulling position.

3. Sorting and packaging unit according to Claim 2,
characterised in that the coupling members of the coupling
arms (12) consist of a finger (15) extending vertically
beneath the said coupling arms, the coupling members of the
5 plates (16) consisting of a receptacle (19) made in the
said plates and equipped with a longitudinal opening for
lateral introduction and escape of the fingers (15) of the
coupling arms (12) upon the pivoting of the latter.
- 10 4. Sorting and packaging unit according to one of Claims
2 and 3, characterised in that:
- the uncoupling means comprise, for each work
station Cm, Dn, means (36) for supporting and
guiding the coupling members (15) of the coupling
15 arms (12), capable of bringing about a pivoting
of the said coupling arms towards an intermediate
position between their grasping position and
their pulling position, counter to the force
exerted by the associated resilient means (14),
20 then of allowing a reverse pivoting of the
coupling arms (12) so that the latter extend in
their grasping position vertically in line with
the front of the queue position of the plates
(16) on the relief track (29),
 - 25 - the coupling means (41, 45, 46) comprise a
retractable supporting member (41) capable of
selectively deviating the coupling arms (12) from
their grasping position, vertically in line with
the front of the queue position of the plates
30 (16) on the relief track (29).
5. Sorting and packaging unit according to Claim 4,
characterised in that the uncoupling means comprise a fixed

ramp (36) for supporting and guiding the coupling members (15) of the coupling arms (12), which is arranged above the central section (32) of the relief track (29) and has an oblique initial unhitching section (37) secant with respect to the axis of the central section (32) of the relief track (29), a central section (38) parallel to the said axis, and an oblique final hitching section (39) secant with respect to the axis of the central section (32) of the relief track (29).

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6. Sorting and packaging unit according to one of Claims 4 and 5, characterised in that the retractable supporting member (41) consists of a cam (41) articulated about a vertical axis and equipped with a longitudinal border (43, 44) for supporting and guiding the coupling members (15) of the coupling arms (12), the coupling means comprising, in addition, actuating means (45, 46) capable of pivoting the said cam between an active position for supporting and guiding the coupling members (15) of the coupling arms (12), and a passive position retracted with respect to the said coupling members in their grasping position.

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7. Sorting and packaging unit according to Claim 6, characterised in that each work station Cm, Dn has a manually-actuated member (54) for activating the actuating means (45, 46), which is capable of bringing about the pivoting of the cam (41) towards its passive position.

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8. Sorting and packaging unit according to one of Claims 6 and 7, characterised in that the cam (41) has a stop peg (48) extending vertically beneath the said cam and adapted to lodge in a longitudinal groove (20) made in the plates (16), in the active position of the said cam, and to escape

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from the said longitudinal groove, through a lateral opening (21) made in this longitudinal groove (20), upon the pivoting of this cam (41) from its active position towards its passive position.

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9. Sorting and packaging unit according to one of the preceding claims, characterised in that the means for driving the plates (16) along the central section (32) of the relief tracks (29) comprise an endless chain (40) moving in a vertical plane, having a horizontal strand integrated in the relief track (29), for bearing the plates (16).

10. Sorting and packaging unit according to one of the preceding claims, characterised in that the conveying track (17) and each relief track (29) comprise a longitudinal slot (18, 30) made in the said tracks, each plate (16) having a vertical rod (23) secured beneath the said plate so as to extend through the slot (18, 30) of the tracks (17, 29), and carrying a member (24) for hooking on a product.

11. Sorting and packaging unit according to one of the preceding claims, characterised in that the detecting station (11) comprises two detecting cells which are vertically offset and arranged so as to discriminate respectively, upon the passage of a coupling arm (12), between the presence of an empty plate (16) coupled to the said coupling arm, and the presence of a plate (16) loaded with a product attached to this coupling arm (12).

12. Sorting and packaging unit according to one of the preceding claims, characterised in that each work station

Cm, Dn has a cell, called the exit cell (50), for detecting the presence of a plate (16) in the front of the queue position on the relief track (29), the managing means being programmed to inhibit the operation of the coupling means (41, 45, 46) in the absence of the activation of the said detecting cell.

13. Sorting and packaging unit according to one of the preceding claims, characterised in that each work station Cm, Dn has a cell, called the entry cell (49), for detecting the passage of an uncoupled plate (16) on the central section (32) of the relief track (29), the managing means being programmed to inhibit the routing means (34, 35), so as to prevent access to the said relief track, and to stop the movement of the conveying chain (1), in the absence of sequences of activation/deactivation of the said detecting cell.

14. Sorting and packaging unit according to one of the preceding claims, characterised in that:

- each unloading station Dn has two supports capable of each receiving a package to be filled, each of the said supports having a distinctive sign capable of enabling its identification with an indicator light (52, 53) dedicated to the said support,
- the managing means are programmed, for each unloading station Dn, to bring about selective lighting of the indicator lights (52, 53) in order, using the unit-weight information of each product, to:

- control the filling of a first package until a reference net filling weight less than the total net weight of the package is obtained,

- once the reference weight is obtained,
5 select, from among the products ready at the unloading station Dn, a combination of products, the total weight of which makes it possible to come as close as possible up to the total net weight,

- control the depositing of the products
10 arriving at the front of the queue and not previously selected into the second, initially empty package, and the depositing of the previously selected products into the first package,

- signal, once the selected products have been
15 unhooked, the end of the filling of the first package so as to enable its discharge and replacement,

- and control the continuation of the filling of the first package.